MULTIMEDIA UNIVERSITY

STUDENT ID NO

MULTIMEDIA UNIVERSITY

FINAL EXAMINATION

TRIMESTER 1, 2018/2019

EME1016 – APPLIED STATICS

(ME)

24 OCTOBER 2018
2:30 p.m – 4:30 p.m
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This Question paper consists of 6 pages with 4 Questions only.

2. Attempt **ALL** questions. All questions carry equal marks and the distribution of the marks for each question is given.

3. Please write all your answers in the Answer Booklet provided.

Question 1:

(a) Two cables are used to secure the overhang boom in position as shown in **Figure 1** and support the 1500 N load. The resultant force is directed along the boom from point A towards O.

(i) Find the Cartesian vector form of F_B **[4 marks]**

(ii) Find the Cartesian vector form of F_C in terms of x **[4 marks]**

(iii) Determine the value of x for the coordinate of point C and the resultant force. **[7 marks]**

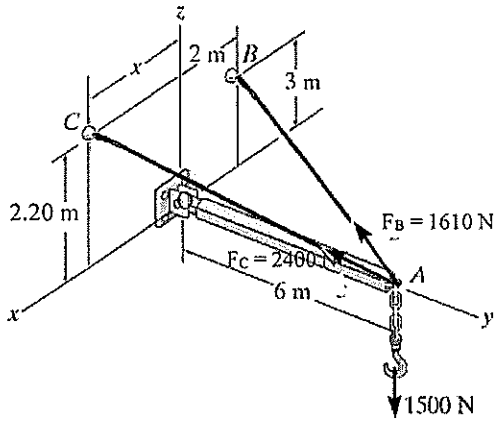


FIGURE 1

(b) Figure 2 shows a flag pole which been secured by two tight cables. Determine the resultant moment produced by the resultant force at point O. Express the result as Cartesian vector. **[10 marks]**

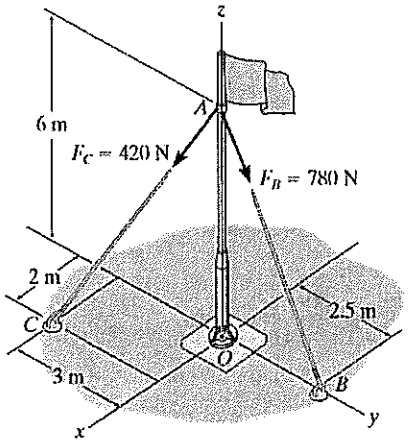


FIGURE 2

Continued.....

Question 2:

Figure 3 shows a truss which is supported by four external loads. The truss is supported by a hinge at A and roller at F.

(a) Draw the FBD of the truss **[4 marks]**
(b) Find the reaction of the support at A **[5 marks]**
(c) Find the reaction of the support at F **[5 marks]**
(d) Find the internal force within the members DC, HC and HI. State whether it is compressive or tensile **[11 marks]**

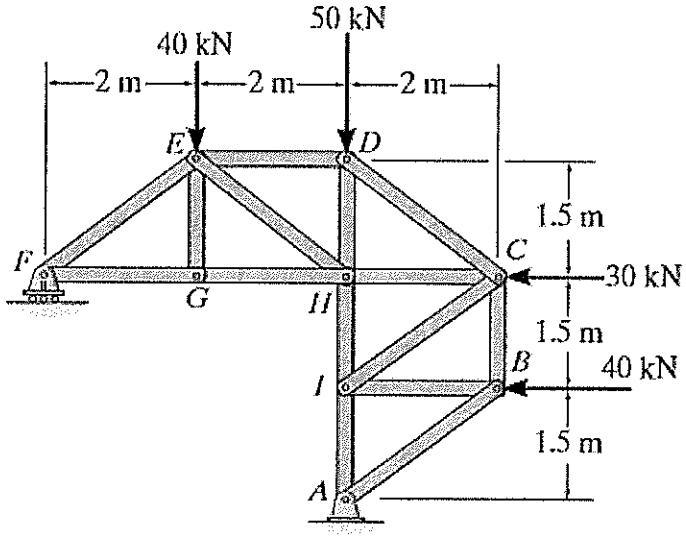


FIGURE 3

Continued.....

Question 3:

(a) **Locate** the centroid $(\bar{x}, \bar{y})$ of the shaded area as shown in **Figure 4.** **[17 marks]**

(b) **Determine** the moment of inertia for the shaded area about the y axis (I_y) as shown in **Figure 4.** **[8 marks]**

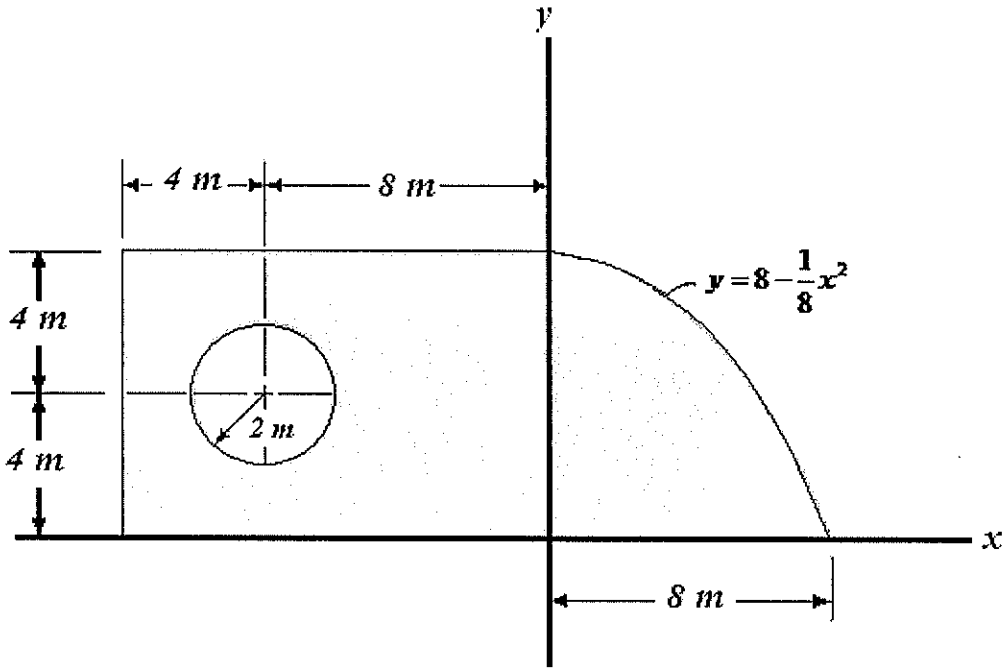


FIGURE 4

Continued.....

Question 4:

Figure 5 shows the block of weight W is being pulled up the inclined plane of slope α using a force P. The coefficient of friction of the contact surface is μ. If P acts at the angle ϕ as shown in **Figure 5**.

(a) Draw the free body diagram for the block. **[5 marks]**

(b) Show that for slipping to occur, $P = W\dfrac{\sin(\alpha+\theta)}{\cos(\phi-\theta)}$ where $\theta = \tan^{-1}\mu$. **[15 marks]**

(c) Determine the force P, if the mass of the block is 150 kg and the coefficient of friction, μ is 0.45. Assume $\alpha = 10°$ and $\phi = 30°$. **[5 marks]**

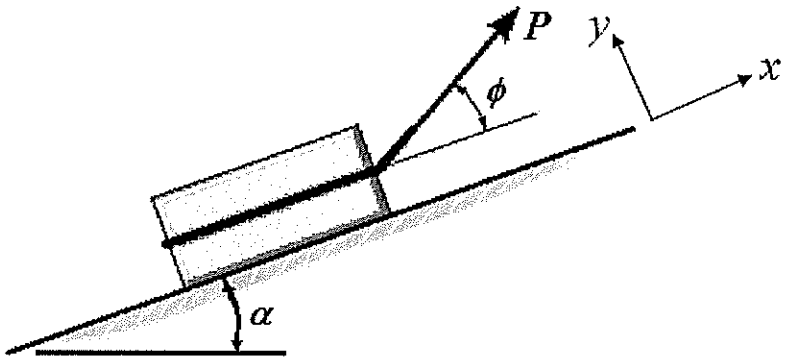
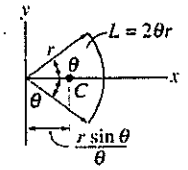
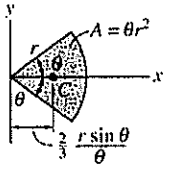
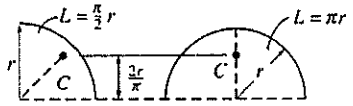
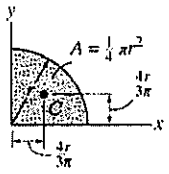
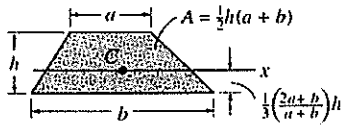
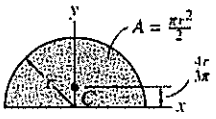
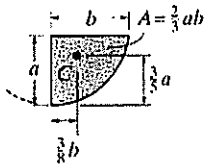
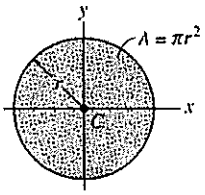
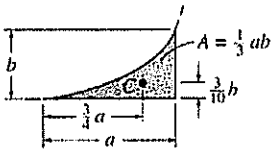
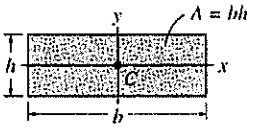
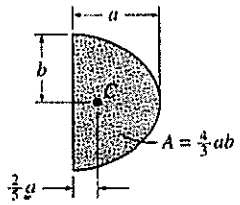
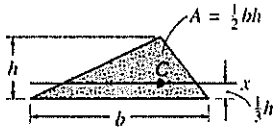


FIGURE 5

Continued.....

Appendix: Geometric properties of line and area elements

Centroid Location	Centroid Location	Area Moment of Inertia
 Circular arc segment	 Circular sector area	$I_x = \frac{1}{4}r^4(\theta - \frac{1}{2}\sin 2\theta)$ $I_x = \frac{1}{4}r^4(\theta + \frac{1}{2}\sin 2\theta)$
 Quarter and semicircle ares	 Quarter circle area	$I_x = \frac{1}{16}\pi r^4$ $I_y = \frac{1}{16}\pi r^4$
 Trapezoidal area	 Semicircular area	$I_x = \frac{1}{8}\pi r^4$ $I_y = \frac{1}{8}\pi r^4$
 Semiparabolic area	 Circular area	$I_x = \frac{1}{4}\pi r^4$ $I_y = \frac{1}{4}\pi r^4$
 Exparabolic area	 Rectangular area	$I_x = \frac{1}{12}bh^3$ $I_y = \frac{1}{12}hb^3$
 Parabolic area	 Triangular area	$I_x = \frac{1}{36}bh^3$

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